WHAT IS CLAIMED IS:

1. A spectroscopic ellipsometer for measuring a sample, including:

a source which emits broadband radiation;

a polarizer for polarizing the broadband radiation, thereby producing a sample beam;

an analyzer positioned for receiving radiation of the sample beam that has reflected from the sample, wherein the analyzer produces an output beam in response to said radiation;

detector means for detecting the output beam; and

all-reflective optics between the polarizer and the analyzer, wherein the sample beam reflects with low incidence angle from each component of the all-reflective optics, and wherein the all-reflective optics reflectively focuses the sample beam to a small spot on the sample.

2. The ellipsometer of claim 1, wherein the all-reflective optics reflectively focuses the sample beam to the spot at a high incidence angle.

3. The ellipsometer of claim 1, wherein the all-reflective optics reflectively focuses the sample beam to the spot at a range of high incidence angles.

4. The ellipsometer of claim 3, wherein the range of high incidence angles is a substantial range of high incidence angles, and also including:

an incidence angle selection element for selecting, for measurement by the detector means, only radiation reflected from the sample at a subrange of said substantial range of high incidence angles.

5. The ellipsometer of claim 4, wherein said subrange is a single, selected angle.

6. The ellipsometer of claim 4, wherein said subrange is a narrow range of angles.

7. The ellipsometer of claim 4, wherein the substantial range of high incidence angles is the range from about 63.5 degrees to about 80.5 degrees, and the subrange is a narrow range of angles centered at Brewster's angle for the sample.

8. The ellipsometer of claim 4, wherein the incidence angle selection element is an apertured plate with a slit therethrough.

9. The ellipsometer of claim 8, wherein the apertured plate is movably mounted with respect to the optical path of said radiation reflected from the sample, and also including:

actuator means for moving the apertured plate to a position at which the slit determines said subrange of said substantial range of high incidence angles.

10. The ellipsometer of claim 1, wherein the all-reflective optics reflectively focuses the sample beam to a small, compact spot on the sample.

11. The ellipsometer of claim 10, also including:

an apertured entrance element positioned between the source and the polarizer, said entrance element including an elongated entrance slit for passing a beam of said broadband radiation to the polarizer,

wherein each of the beam and the sample beam has an elongated cross-section, and

wherein the all-reflective optics includes means for reflectively focusing the sample beam to a small, substantially square spot on the sample.

12. The ellipsometer of claim 10, wherein the sample beam has an elongated cross-section, and wherein the all-reflective optics includes an elliptical focusing mirror which reflectively focuses the sample beam to a small, substantially square spot on the sample.

13. The ellipsometer of claim 1, wherein the detector means is a spectrometer, and wherein the spectrometer includes photosensitive means for measuring intensity of said output beam at each of a number of different wavelength ranges.

14. The ellipsometer of claim 13, wherein the photosensitive means is an intensified photodiode array.

15. The ellipsometer of claim 1, wherein the polarizer is a minimal-length Rochon prism.

16. The ellipsometer of claim 15, wherein the minimal-length Rochon prism is rotatably mounted for rotation about the optical path.

17. The ellipsometer of claim 1, also including:

an apertured entrance element positioned between the source and the polarizer, said entrance element including an entrance slit for passing a beam of said broadband radiation to the polarizer; and

an optical fiber positioned between the source and the entrance element for directing said broadband radiation to the entrance element.

18. The ellipsometer of claim 1, also including:

reference channel means for diverting a reference portion of the broadband radiation from the source directly to the detector means in such a manner that said reference portion does not reflect from the sample.

19. The ellipsometer of claim 18, wherein the detector means includes:

first photodiode array means for measuring the output beam; and

second photodiode array means for measuring said reference portion.

20. The ellipsometer of claim 18, wherein the reference channel means includes a bifurcated optical fiber having an inlet end positioned for receiving the broadband radiation, a first outlet end for directing a sample portion of the broadband radiation to the polarizer, and a second outlet end for directing the reference portion directly to the detector means.

21. The ellipsometer of claim 1, also including:

sample stage means for supporting the sample and moving the sample relative to the all-reflective optics; and

an autofocus assembly for measuring a focus signal indicative of radiation reflected from a spot on the sample during movement of the sample stage means with the sample supported thereon, whereby a best focus position of the all-reflective optics

relative to the sample can be determined from the focus signal.

22. The ellipsometer of claim 21, wherein the autofocus assembly includes:

a dual photodiode detector, which receives a substantially focused image of the spot.

23. The ellipsometer of claim 22, also including:

a beamsplitting mirror positioned along the optical path between the all-reflective optics and analyzer, for diverting said radiation reflected from a spot on the sample during movement of the sample stage means to the dual photodiode detector.

24. The ellipsometer of claim 23, wherein the dual photodiode detector includes a first photodiode which outputs a first intensity signal and a second photodiode which outputs a second intensity signal, and wherein the autofocus assembly also includes:

a processor which receives the first intensity signal and the second intensity signal, wherein the processor is programmed to process the first intensity signal and the second intensity signal to generate a focus signal indicative of said best focus position.

25. The ellipsometer of claim 21, wherein the autofocus assembly includes:

camera means; and

an apertured mirror positioned along the optical path between the all-reflective optics and analyzer, for reflecting said radiation reflected from a spot on the sample during movement of the sample stage means to the camera means.

26. The ellipsometer of claim 1, wherein the broadband radiation includes UV radiation but not visible radiation.

27. The ellipsometer of claim 1, wherein the broadband radiation includes UV, visible, and near infrared radiation.

28. A method for performing spectroscopic ellipsometry measurements on a sample, including the steps of:

(a) polarizing the broadband radiation, thereby producing a sample beam;

(b) reflectively focusing the sample beam to a small spot on the sample using all-reflective optics;

(c) analyzing radiation of the sample beam that has reflected from the sample, thereby producing an output beam; and

(d) detecting the output beam.

29. The method of claim 28, wherein step (b) includes the step of reflectively focusing the sample beam to the spot at a high incidence angle.

30. The method of claim 28, wherein step (b) includes the step of reflectively focusing the sample beam to the spot at a range of high incidence angles.

31. The method of claim 30, wherein the range of high incidence angles is a substantial range of high incidence angles, and also including the step of:

(e) selecting, for detection, only radiation reflected from the sample at a subrange of said substantial range of high incidence angles.

32. The method of claim 31, wherein said subrange is a narrow range of angles.

33. The method of claim 31, wherein the substantial range of high incidence angles is the range from about 63.5 degrees to about 80.5 degrees, and the subrange is a narrow range of angles centered at Brewster's angle for the sample.

34. The method of claim 31, wherein step (e) includes the step of:

moving an apertured plate having an elongated slit therethrough to a position at which the slit determines said subrange of said substantial range of high incidence angles.

35. The method of claim 28, wherein step (b) includes the step of reflectively focusing the sample beam to a small, compact spot on the sample.

36. The method of claim 35, wherein the sample beam has an elongated cross-section, and wherein the small, compact spot is a small, substantially square spot.

37. The method of claim 28, wherein the sample beam has an elongated cross-section, and wherein step (b) includes the step of reflectively focusing the sample beam from an elliptical focusing mirror to a small, substantially square spot on the sample.

38. The method of claim 28, wherein step (d) includes the step of directing the output beam to an intensified photodiode array, thereby measuring intensity of said output beam at each of a number of different wavelength ranges.

39. The method of claim 28, wherein step (a) includes the step of rotating a minimal-length Rochon prism.

40. The method of claim 28, also including the step of:

diverting a reference portion of the broadband radiation directly to a detector means in such a manner that said reference portion does not reflect from the sample.

41. The method of claim 28, also including the steps of:

supporting the sample on a sample stage means and moving the sample and sample stage means relative to the all-reflective optics; and

measuring a focus signal indicative of radiation reflected from a spot on the sample during movement of the sample stage means and the sample, whereby a best focus position of the all-reflective optics relative to the sample can be determined from the focus signal.

42. The method of claim 28, wherein step (b) includes the step of reflectively focusing the sample beam to a small spot on the sample in such a manner that the sample beam reflects with low incidence angle from each component of the all-reflective optics.

43. An optical instrument, including a spectrophotometer and an ellipsometer integrated together as a single instrument with the spectrophotometer, said instrument including:

radiation source means which emits radiation; and

means for directing a first portion of the radiation to the spectrophotometer and a second portion of the radiation to the ellipsometer, wherein the spectrophotometer and the ellipsometer simultaneously focus the radiation received thereby to a single, common focal point on a sample.

44. The optical instrument of claim 43, wherein the radiation source means is a lamp shared by the spectrophotometer and the ellipsometer.

45. The optical instrument of claim 43, wherein the spectrophotometer and the ellipsometer focus the radiation to a small, compact spot on the sample.

46. The optical instrument of claim 43, wherein the radiation is broadband radiation.

47. The optical instrument of claim 46, wherein the ellipsometer includes:

a polarizer for polarizing the broadband radiation, thereby producing a sample beam;

an analyzer positioned for receiving radiation of the sample beam that has reflected from the sample, wherein the analyzer produces an output beam in response to said radiation;

detector means for detecting the output beam; and

all-reflective optics between the polarizer and the analyzer, wherein the sample beam reflects with low incidence angle from each component of the all-reflective optics, and wherein the all-reflective optics reflectively focuses the sample beam to a small spot on the sample.

48. An optical instrument, including a spectrophotometer and an ellipsometer integrated together as a single instrument with the spectrophotometer, said instrument including:

radiation source means which emits radiation; and

beam diverting means for directing the radiation to a selected one of the spectrophotometer and the ellipsometer, to enable only said selected one of the spectrophotometer and the ellipsometer to focus said radiation received from the beam diverting means to a spot on a sample.

49. The optical instrument of claim 48, wherein the radiation source means is a single lamp.

50. The optical instrument of claim 48, wherein the radiation is broadband radiation.

51. The optical instrument of claim 50, wherein the ellipsometer includes:

a polarizer for polarizing the broadband radiation, thereby producing a sample beam;

an analyzer positioned for receiving radiation of the sample beam that has reflected from the sample, wherein the analyzer produces an output beam in response to said radiation;

detector means for detecting the output beam; and

all-reflective optics between the polarizer and the analyzer, wherein the sample beam reflects with low incidence angle from each component of the all-reflective optics, and wherein the all-reflective optics reflectively focuses the sample beam to a small spot on the sample.

52. The optical instrument of claim 48, wherein the beam diverting means includes:

a movably mounted mirror; and

an actuator for moving the mirror to a selected one of a first position in which said mirror reflects the radiation to the ellipsometer, and a second position in which said mirror allows the radiation to propagate to the spectrophotometer.